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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/558,003	04/24/2000	Toshikazu Hori	SS-722-07	7687

7590 02/02/2004

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EXAMINER	
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ART UNIT	**PAPER NUMBER**
2612	3

DATE MAILED: 02/02/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/558,003	Applicant(s) HORI ET AL.
	Examiner Kelly L. Jerabek	Art Unit 2612

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-12* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-12* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *24 April 2000* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

13)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

a) ☐ The translation of the foreign language provisional application has been received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 2.

4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .

5) ☐ Notice of Informal Patent Application (PTO-152)

6) ☐ Other: .

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1, and 4 rejected under 35 U.S.C. 103(a) as being unpatentable over Alston US 4,647,975 in view of Ahn US 5,768,442.

Re claim 1, Alston discloses in figure 1 an electronic imaging camera (10) including an image-sensing array (14) with an analog video output having a linear dynamic range. The electronic imaging camera also includes a preamplifier (20) to adjust the analog gain of the analog video output. In addition, the camera includes an analog to digital converter (26). However, Alston does not disclose a digital translation table providing a dual-slope output conversion in which a first linear gain is applied to a zero-to-middle part of the linear dynamic range, and a second linear digital gain is applied to a middle-to-full scale part of the linear dynamic range.

Ahn discloses in figure 5, Input/Output characteristic curves used by a digital signal conversion apparatus (fig. 3). A digital signal processor (fig. 3: 34) inputs knee point information (N) and selects one of a plurality of pre-stored input/output

characteristic functions shown in figure 5 (dol. 4, lines 13-22). The input/output characteristic functions shown in figure 5 provide a dual-slope output conversion in which a first linear gain is applied to a zero-to-middle part of the linear dynamic range, and a second linear digital gain is applied to a middle-to-full scale part of the linear dynamic range. In addition, the zero-to-middle part and the middle-to-full part are connected by a knee point (fig. 2: KP). Using pre-stored I/O characteristic functions to provide a dual-slope output conversion is advantageous because it allows the gain to be varied according to varying brightness levels. For this reason, it would have been obvious to include a plurality of pre-stored I/O characteristic functions as taught in Ahn in the camera disclosed by Alston. Doing so would provide a means for varying the gain according to different parts of the linear dynamic range.

Re claim 4, the digital signal processor inputs the input video signal and converts the signal based on a selected one of a plurality of input/output characteristic functions (abstract). The plurality of input/output characteristics is shown in figure 5.

Claims 2, 3, 7 and 8 rejected under 35 U.S.C. 103(a) as being unpatentable over Alston in view of Ahn and further in view of Murata et al. US 5,325,182.

Re claim 2, Alston in view of Ahn discloses all of the limitations of claim 1. However, Alston in view of Ahn does not show that the dual-slope output conversion includes a zero-to-middle part with a gain greater than one, and a middle-to-full part with a gain less than one.

Murata shows in figure 19 an input/output characteristic of a knee correction. The input/output characteristic includes a zero-to-middle part with a single gain greater than one (fig. 19, before dashed line), and a middle-to-full part with a single gain less than one (fig. 19, after dashed line). Using I/O characteristic functions to provide a dual-slope output conversion is advantageous because it allows the gain to be varied according to varying brightness levels. For this reason, it would have been obvious to include an I/O characteristic function as taught in Murata in the camera disclosed by Alston in view of Ahn. Doing so would provide a means for varying the gain according to different parts of the linear dynamic range.

Re claim 3, Alston in view of Ahn discloses all of the limitations of claim 1. However, Alston in view of Ahn does not show that the dual-slope output conversion includes a zero-to-middle part with a gain less than one, and a middle-to-full part with a gain greater than one.

Murata shows in figure 18 an input/output characteristic of a knee correction. The input/output characteristic includes a zero-to-middle part with a single gain less than one (fig. 18, before dashed line), and a middle-to-full part with a single gain greater than one (fig. 18, after dashed line). Using I/O characteristic functions to provide a dual-slope output conversion is advantageous because it allows the gain to be varied according to varying brightness levels. For this reason, it would have been obvious to include an I/O characteristic function as taught in Murata in the camera disclosed by Alston in view of Ahn. Doing so would provide a means for varying the gain according to different parts of the linear dynamic range.

Re claim 7, Alston discloses in figure 1 an electronic imaging camera (10) including an image-sensing array (14) with an analog video output having a linear dynamic range. The analog video signal is controlled by the analog signal conditioning circuit (22). Since the analog video signal has a linear dynamic range (col. 2, lines 4-7) it has a limited operating range between a first magnitude and a second magnitude. The analog video signal is converted to a digital signal by an analog to digital converter (26). See also (col. 3, lines 63-68). The conversion of an analog signal to a digital signal is well known in the art. The analog to digital converter (26) converts the first analog magnitude is converted to a third magnitude that is digital, and the second analog magnitude is converted to a fourth magnitude that is digital. However, Alston does not disclose that the digital video signal is translated according to two linear

amplifications, wherein the first linear amplification exceeds that second linear amplification in gain.

Ahn discloses in figure 5, Input/Output characteristic curves used by a digital signal conversion apparatus (fig. 3). In figure 5, the first linear amplification (before the knee point) exceeds the second linear amplifications in gain. Using pre-stored I/O characteristic functions to provide a dual-slope output conversion is advantageous because it allows the gain to be varied according to varying brightness levels. For this reason, it would have been obvious to include a plurality of pre-stored I/O characteristic functions where the first linear amplification exceeds the second linear amplification in gain as taught in Ahn in the camera disclosed by Alston. Doing so would provide a means for varying the gain according to different parts of the linear dynamic range.

Alston in view of Ahn discloses all of the above limitations of claim 7. However, Alston in view of Ahn does not state that the first linear amplification provides increased gain in a darker portion of a video image, and the second linear amplification provides reduced gain in a brighter portion of a video image.

Murata shows in figure 19 an input/output characteristic of a knee correction. The input/output characteristic includes a first linear amplification that provides for increased gain in a darker portion of a video image (fig. 19, before dashed line), and a second linear amplification that provides for reduced gain in a brighter portion of a video image (fig. 19, after dashed line). Using I/O characteristic functions to provide a dual-slope output conversion is advantageous because it allows the gain to be varied

according to varying brightness levels. For this reason, it would have been obvious to include an I/O characteristic function as taught in Murata in the camera disclosed by Alston in view of Ahn. Doing so would provide a means for varying the gain according to different parts of the linear dynamic range.

Re claim 8, Ahn discloses that a memory device stores look-up tables, and provides for a choice of first and second linear amplification gains (col. 2, lines 33-44; fig. 5).

Claims 5,6 and 10 rejected under 35 U.S.C. 103(a) as being unpatentable over Alston in view of Ahn and further in view of Sarbadhikari et al. US 5,477,264.

Re claim 5, Alston in view of Ahn discloses all of the limitations of claim 1. However, Alston in view of Ahn does not show that the digital translation table is programmable and downloadable.

Sarbadhikari discloses in figure 2 a programmed digital signal processor (22) containing algorithms that are stored in a memory (col. 6, lines 27-33). In addition, the algorithms used by the digital signal processor (22) are downloadable (col. 9, lines 2-9). Using a programmable and downloadable digital signal processor is advantageous because it allows the user to download and change algorithms and other information stored in the digital signal processor such as input/output characteristics. For this reason, it would have been obvious to include a programmable and downloadable

digital signal processor as taught in Sarbadhikari in the camera disclosed by Alston in view of Ahn. Doing so would provide a means for downloading and programming different dual-slope output conversions in order to customize the conversion according to user needs.

Re claim 6, the processor (20) disclosed by Sarbadhikari acts as a programming and download controller as it downloads the processing algorithms (col. 9, lines 2-9).

Re claim 10, Alston discloses in figure 1 an electronic imaging camera (10) including an image-sensing array (14) with an analog video output having a linear dynamic range. The analog video signal is controlled by the analog signal conditioning circuit (22). Since the analog video signal has a linear dynamic range (col. 2, lines 4-7) it has a limited operating range between a first magnitude and a second magnitude. The analog video signal is converted to a digital signal by an analog to digital converter (26). See also (col. 3, lines 63-68). The conversion of an analog signal to a digital signal is well known in the art. The analog to digital converter (26) converts the first analog magnitude is converted to a third magnitude that is digital, and the second analog magnitude is converted to a fourth magnitude that is digital. However, Alston does not disclose a digital translation table providing a dual-slope output conversion in which a first linear gain is applied to a zero-to-middle part of the linear dynamic range, and a second linear digital gain is applied to a middle-to-full scale part of the linear

dynamic range. In addition, Alston does not disclose that a plurality of dual-slope output conversions coexist and are selectable.

Ahn discloses in figure 5, Input/Output characteristic curves used by a digital signal conversion apparatus (fig. 3). A digital signal processor (fig. 3: 34) inputs knee point information (N) and selects one of a plurality of pre-stored input/output characteristic functions shown in figure 5 (dol. 4, lines 13-22). The input/output characteristic functions shown in figure 5 provide a dual-slope output conversion in which a first linear gain is applied to a zero-to-middle part of the linear dynamic range, and a second linear digital gain is applied to a middle-to-full scale part of the linear dynamic range. Using pre-stored I/O characteristic functions to provide a dual-slope output conversion is advantageous because it allows the gain to be varied according to varying brightness levels. For this reason, it would have been obvious to include a plurality of pre-stored I/O characteristic functions as taught in Ahn in the camera disclosed by Alston. Doing so would provide a means for varying the gain according to different parts of the linear dynamic range.

Alston in view of Ahn discloses all of the above limitations of claim 10. However, Alston in view of Ahn does not state that a programming and download controller provides modifications to the dual-slope output conversions.

Sarbadhikari discloses in figure 2 a programmed digital signal processor (22) containing algorithms that are stored in a memory (col. 6, lines 27-33). In addition, the algorithms used by the digital signal processor (22) are downloadable (col. 9, lines 2-9). Using a programmable and downloadable digital signal processor is advantageous

because it allows the user to download and change algorithms and other information stored in the digital signal processor such as input/output characteristics. For this reason, it would have been obvious to include a programmable and downloadable digital signal processor as taught in Sarbadhikari in the camera disclosed by Alston in view of Ahn. Doing so would provide a means for downloading and programming different dual-slope output conversions in order to customize the conversion according to user needs.

Claim 9 rejected under 35 U.S.C. 103(a) as being unpatentable over Alston in view of Ahn in view of Murata and further in view of Sarbadhikari.

Re claim 9, Alston in view of Ahn in view of Murata discloses all of the limitations of claim 7. However, Alston in view of Ahn in view of Murata does not state that a new look-up table is downloaded and programmed.

Sarbadhikari discloses in figure 2 a programmed digital signal processor (22) containing algorithms that are stored in a memory (col. 6, lines 27-33). In addition, the algorithms used by the digital signal processor (22) are downloadable (col. 9, lines 2-9). Using a programmable and downloadable digital signal processor is advantageous because it allows the user to download and change algorithms and other information stored in the digital signal processor such as look-up tables. For this reason, it would have been obvious to include a programmable and downloadable digital signal processor as taught in Sarbadhikari in the camera disclosed by Alston in view of Ahn in

view of Murata as applied to claim 7. Doing so would provide a means for downloading and programming different look-up tables in order to customize the conversion according to user needs.

Claims 11 and 12 rejected under 35 U.S.C. 103(a) as being unpatentable over Alston in view of Nakamura et al. US 6,515,700.

Re claim 11, Alston discloses in figure 1 an electronic imaging camera (10) including an image-sensing array (14) with an analog video output having a linear dynamic range. The electronic imaging camera also includes a preamplifier (20) to adjust the analog gain of the analog video output. In addition, the camera includes an analog to digital converter (26). However, Alston does not disclose a digital translation table providing an output conversion in which at least three different linear digital gains are applied to the linear dynamic range of the imaging device.

Nakamura discloses in figure 6 a color video camera. The color video camera includes an output conversion consisting of three different linear digital gains applied to the dynamic range of the camera (figure 8: R', B'). Using pre-stored I/O characteristic functions to provide output conversion with at least three different linear digital gains is advantageous because it allows the gain to be varied according to varying brightness levels in order to obtain a desired output signal. For this reason, it would have been obvious to include an output conversion consisting of three different linear digital gains

as taught in Nakamura in the camera disclosed by Alston. Doing so would provide a means for varying the gain according to different parts of the linear dynamic range.

Re claim 12, the multi-slope output conversion includes two knee-points that join the different linear digital gains (fig. 8).

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Kawa (US 5,949,482) discloses optimization processing for an integrated circuit physical design automation system using optimally switched cost function computations. The information regarding dynamic range and knee points is pertinent material.

Kawai (US 6,141,047) discloses an image signal processing apparatus and image pickup device. The information regarding knee characteristics is pertinent material.

Kawa et al.(US 6,002,796) discloses a video signal compression apparatus utilizing multiple compression ratios. The information regarding multiple knee points is pertinent material.

Hattori et al. (US 5,903,316) discloses an information signal processing apparatus. The information regarding input/output characteristic curves is pertinent material.

Ikeda (US 5,801,773) discloses an image data processing apparatus for processing combined image signals in order to extend dynamic range. The information regarding input/output characteristic curves is pertinent material.

Contacts

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Examiner Kelly Jerabek whose telephone number is (703) 305-8659. The examiner can normally be reached on Monday - Friday (8:00 AM - 5:00 PM).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's primary examiner, Wendy Garber can be reached at (703)-305-4929.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-305-4700.

The fax number for submitting <u>all Official communications</u> is (703) 872-9306.

The fax number for submitting <u>informal communications</u> such as drafts, proposed amendments, etc., may be faxed directly to the Examiner at (703) 746-3059.

KLJ

NGOC-YEN VU
PRIMARY EXAMINER